Howard

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HEADQUARTERS
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES
AIR FORCE RESEARCH DIVISION (ARDC)
UNITED STATES AIR FORCE
LAURENCE G. HANSCOM FIELD BEDFORD, MASSACHUSETTS

REPLY TO
ATTN OF: CRZC/Dr. Howard/2570 10 October 1960

SUBJECT: Discussion of Information

TO: Prof. Joshua Lederberg
Stanford University
Medical Center
Palo Alto, California

Dear Professor Lederberg

1. Referring to the description of the high altitude infrared solar spectra obtained at RAE and reported by Dave Robinson in European Scientific Notes 14-2 (2/1/60), we are indeed familiar with this work. Here is a short history of this effort.

2. Several years ago (1947 or 48) there were some articles in the British review "Reports on Progress in Physics" by T. G. Cowling on the water vapor content of the atmosphere and by Sutherland and Wormell on minor constituents in the atmosphere. Sutherland had several students whodid work on minor constituents by measuring the infrared solar spectrum. The best known is R. M. Goody (now at Harvard) who put a spectrometer in a mosquito aircraft and made measurements up to 30,000 ft around 1950. Another is John H. Shaw (now at Ohio State). The infrared group at the Radar Research Establishment at Malvern refined Goody's spectrum in 1953 from a Lincoln aircraft (J. Sci. Instr. 30 5 (1953)). Two years later Dr. Trevor S. Moss of this group moved to the Royal Aircraft Establishment and had a stroke of luck in obtaining Dr. John T. Houghton, a physical meteorologist who had to serve a two-year military hitch. Houghton had some experience with flying infrared equipment (J. Sci. Instr. 31 184 (1954)) and in early 1956 they began the design of a grating spectrometer to install in a Canberra. Prof. Shaw and I visited Farnborough in mid-1956, at which time we all agreed that their results would be presented in the same format as the Ohio State and Liege solar atlases. Their first flight was in mid-June 1957, and the last in December 1959, when the plane reached its compulsory retirement age. By this time, John Houghton was back at Oxford, Dr. S. D. Smith had come and gone to Imperial College, and John Seeley finished the program. The apparatus is described in J. Sci. Instr. 35 329 (1958). Portions of their spectra are presented in IRIS 5 No. 1 pp 213-220 (1960).

3. This Atlas, when completed, will be along the lines of Migeotte's, with spectra plotted as a function of wavelength, of altitude, of

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latitude, of time of year, and of solar elevation. There is a possibility that it may be printed as a Scientific Report on our contract with Imperial College. We will certainly let you know when it is available. Trevor Moss will be here all next week.

Sincerely

John N Howard

JOHN N. HOWARD
Chief (Act'g) Thermal Radiation Laboratory
Geophysics Research Directorate

cc: Dr. Melvin Calvin
Brig. Gen. D. Flickinger
Dr. W. M. Sinton
Dr. Richard Young